Remarks/Arguments

The Examiner has rejected claims 1, 3, 25 to 27 and 33 to 34 under 35 U.S.C. 103 in view of Lu et al 6,554,898.

At the outset it should be pointed out that claims 3, 25 and 34 have been made directly or indirectly dependent upon allowed claim 23 and thus are allowable for the same reasons that claim 23 is allowable. Claims 1, 26-27 and 33 are therefore the only claims that continue to be subject to the above rejection.

In making the above rejection the Examiner states "The Lu et al reference teaches" that "The heater inductively heats the crucible." The Examiner is in error. There is no teaching or suggestion in Lu et al. of any induction heating of anything. "Induction Heating" as defined in McGraw Hill's "Dictionary of Scientific and Technical Terms" (1978) as "Increasing the temperature in a material by induced electric current". **Lu et al teaches or suggests nothing remotely related to such a process** !!!

Further the Examiner states "The sole difference between the instant claims and the prior art is the temperature of the crystal." Again the Examiner is in error since Induction Heating, as above described, is a significant and non-obvious difference between the cited art and the presently claimed invention. Lu et al. uses "resistance heating" as is clearly described in Lu et al. in numerous locations. Resistance heating does not make other forms of heating obvious to one skilled in the art, especially in the present case where induction heating not only permits close temperature control but also overcomes electrical connection, maintenance and service life

problems associated with direct connection resistance electrical heaters used in the prior art of crystal formation, e.g. as described in Lu et al.

The Examiner further states "In the absence of unexpected results, it would have been obvious to one of ordinary skill in the art to determine through routine experimentation the optimum operable temperature of the crystal in the Lu et all reference in order to cool the entire ingot uniformly lowering defects. Again the Examiner seems to have missed the point. Crystals have been drawn from melts for a long time yet the "optimum cooling" referred to by the Examiner has not occurred and as the Examiner refers to it, could not have occurred because in accordance with the invention, cooling of "the entire ingot uniformly lowering defects" does not happen in accordance with the present invention but rather maintains a "temperature **gradient** in the pulled crystal of less than 4° C per centimeter. Lu et al discloses or suggests no such process and no apparatus permitting such a process. Resistance heating cannot easily accomplish such a goal since most resistance heaters have a uniform temperature over their length. Such a condition is not conducive to maintaining a close temperature gradient. The induction heating process and apparatus of the invention can, however accomplish such a gradient since electromagnetic flux density can be easily varied over distance and is easily adjusted. **The results are clearly unexpected in view of the prior art.**

The above rejection should be withdrawn

The Examiner has rejected claims 5, 8, 11, 12, 14, 16 and 18-22 under 35 U.S.C. 103 in view of Lu et al 6,554,898.

It should be pointed out that claims 5, 8, 11, 12, 14, 16 and 18-22 have been made directly or indirectly dependent upon allowed claim 23 and thus are allowable for the same reasons that claim 23 is allowable. The rejection must therefore clearly be withdrawn as it is no longer applicable to the above claims.

The Examiner has rejected claims 28-32 under 35 U.S.C. 103 in view of Lu et al 6,554,898. The rejection should be withdrawn.

The Examiner states "in the absence of unexpected results, it would have been obvious to one of ordinary skill in the art to determine through routine experimentation the optimum, operable materials of construction and adjustable sizes in the Lu et al reference in order to have the apparatus withstand process conditions and to insure that the [sic] all of the ingot is shield [sic] as is the crucible."

Again the Examiner seems to miss a major point. One skilled in the art would not have been able to accomplish the requirements of the process and device of the present invention since the Lu et al. apparatus and method relies upon **resistance heating not induction heating** and thus cannot be easily controlled or adjusted as the Examiner seems to think is so easy. The Examiner fails to cite any support for such an assertion. If the Examiner persists in such a rejection, citation of support is requested or in the alternative an affidavit of the Examiner is requested citing the Examiner's background as an expert qualified to give such an opinion.

The selected "materials" are electroconductive materials that can couple in induction heating unique to the present invention. One skilled in the art would not normally select such

materials for crucibles in the present case in the absence of induction. This is classic impermissible hindsight

As previously discussed, crystals have been drawn from melts for a long time yet the "optimum cooling" referred to by the Examiner has not occurred and as the Examiner refers to it, could not have occurred because in accordance with the invention, cooling of "the entire ingot uniformly lowering defects" does not happen in accordance with the present invention but rather maintains a "temperature **gradient** in the pulled crystal of less than 4° C per centimeter. Lu et al discloses or suggests no such process and no apparatus permitting such a process. Resistance heating cannot easily accomplish such a goal since most resistance heaters have a uniform temperature over their length. Such a condition is not conducive to maintaining a close temperature gradient. The induction heating process and apparatus of the invention can, however accomplish such a gradient since electromagnetic flux density can be easily varied over distance and is easily adjusted. **The results are clearly unexpected in view of the prior art.**

Claims 2, 4, 6, 7, 9, 10, 13, 15, and 17 have been cancelled.

Conclusion

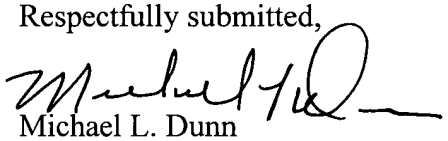
Claims 3, 5, 8, 11, 12, 14, 16, 18-22, 24, 25, and 34-35 now all depend directly or indirectly from claim allowable claim 23. The remaining claims are allowable over the cited art for the reasons previously given.

All amendments are formal in nature and add no new matter and raise no new issues. These amendments were not earlier presented because the need therefore was not apparent until after receipt of the current official action.

An attempt was made to contact the Examiner for a telephone interview prior to submission of this amendment. Such an interview has not yet resulted.

Applicant respectfully submits that all pending claims are now in condition for allowance, which action is courteously requested.

Respectfully submitted,



Michael L. Dunn
Registration No. 25,330
Simpson & Simpson, PLLC
5555 Main Street
Williamsville, NY 14221-5406
Telephone No. 716-626-1564

MLD
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